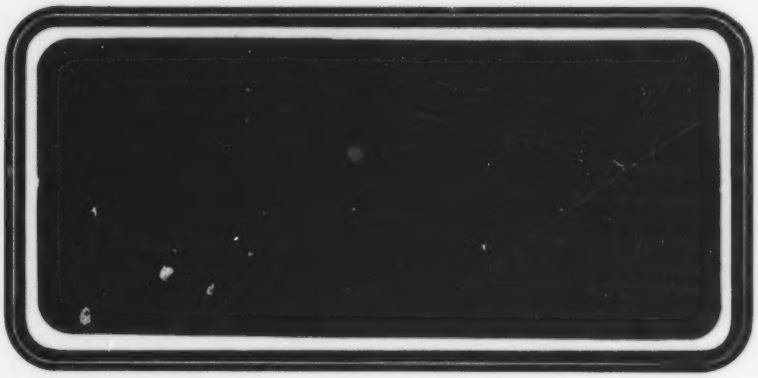
Canada Alberta

FOREST RESOURCE DEVELOPMENT AGREEMENT
ENTENTE SUR LA MISE EN VALEUR DES RESSOURCES FORESTIERES



Canada Alberta

92-04047/

The Canada-Alberta Forest Resource Development Agreement is a subsidiary agreement of the Canada-Alberta Economic and Regional Development Agreement, which provides coordination and cooperation between the governments of Alberta and Canada in areas of Alberta's economic development.

The Canada-Alberta Forest Resource Development Agreement is funded equally by the governments of Canada and Alberta, from April 1, 1984, to March 31, 1989.

Its primary objectives are to ensure the long-term availability of timber supplies; to optimize timber uses; and to contribute to the growth and diversification of Alberta's economy.

The Agreement comprises three programs: Reforestation; Applied research, technology transfer and opportunity identification; and Public information, evaluation and administration. These programs are managed by a joint Directorate and are implemented by Forestry Canada and the Alberta Forest Service.

L'Entente Canada-Alberta sur la mise en valeur des ressources forestières est auxiliaire à l'Entente Canada-Alberta sur le développement économique et régional, qui vise à assurer la coordination et la coopération des deux gouvernements relativement au développement économique de l'Alberta.

L'Entente Canada-Alberta sur la mise en valeur des ressources forestières est financée à parts égales par les gouvernements du Canada et de l'Alberta, et a cours du 1er avril 1984 au 31 mars 1989.

Ses objectifs principaux sont assurer la disponibilité à long terme de réserves de bois; optimiser leur utilisation; et contribuer à la croissance et la diversification de l'économie de la province.

L'Entente comprend trois programmes: Reboisement; Recherche appliquée, transferts de connaissances techniques et relevé des occasions; et Information, évaluation et administration. Ces programmes sont gérés par un Bureau de direction conjoint, et mis en oeuvre par Forêts Canada et le Service forestier de l'Alberta.

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Fire Retardancy

Forestry Department
Alberta Research Council[1]

1990

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[1]Edmonton, Alberta

Project # 2760-G-83

DISCLAIMER

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Summary

The primary objective of this ongoing project is to provide the panel industry with the means of improving the fire retardancy of waferboard/OSB.

As agreed to by industry, government and research organizations the following was done for this project:

i. Five groups of panels were manufactured on the 4' x 8' press to specifications agreed to at the March 28, 1989 meeting.

ii. Mechanical testing in accordance with CAN3-0437.1-M85 was completed on the 5 groups.

iii. Fire testing in accordance with CAN S102-M88 was completed on the 5 groups.

The results indicated very little difference between the mechanical properties of the 5 groups tried. Panels having a sanded surface showed the best flame spread classification. However, the flame spread classification for all groups was extremely high and also showed little difference.

TABLE of CONTENTS

1. **OBJECTIVES** 1

2. **INTRODUCTION** 1

3. **METHODS AND MATERIALS** 1
   - 3.1 **Panel Manufacture** 1
     - 3.1.1 Group "A", Control 2
     - 3.1.2 Group "B" 3
     - 3.1.3 Group "C" 3
     - 3.1.4 Group "D" 4
     - 3.1.5 Group "E" 4
   - 3.2 **Panel Testing** 4
     - 3.2.1 Mechanical Properties 4
     - 3.2.2 Flame Spread 4

5. **RESULTS AND DISCUSSION** 5

6. **CONCLUSIONS** 6

7. **RECOMMENDATIONS** 6

LIST of TABLES

Table		Page
1.	Experimental design	2
2.	General specifications for all panels	2
3.	Summary of mechanical properties	5
4.	Summary of flame spread results	6

LIST of APPENDICES

A. **Analysis of Core Strands Used for 1220 mm x 2440 mm OSB** 8

B. **Analysis of Face Strands Used for 1220 mm x 2440 mm OSB** 13

C. **Individual Test Results for Group "A" (control) OSB** 18

D. Individual Test Results for Group "B" (fines on surface sanded both sides) OSB 28

E. Individual Test Results for Group "C" (0.5% DRICON in face layers) OSB 38

F. Individual Test Results for Group "D" (1.0% DRICON in face layers OSB 48

G. Individual Test Results for Group "E" (sanded one side) OSB 58

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Warnock Hersey Professional Services Ltd.
Weldwood of Canada Limited

1. OBJECTIVES

The primary objective of this ongoing project is to provide the panel industry with the means of improving the fire retardancy of waferboard/OSB.

The specific objectives for ARC in this project are:

i. to manufacture 5 groups of panels on the 4' x 8' press to specifications agreed to at the March 28, 1989 meeting,

ii. to carry out mechanical testing in accordance with CAN3-0437.1-M85 on the 5 groups of panels,

iii. to provide Warnock Hersey with sufficient panels for the fire testing, and

iv. to provide a report including production specifications and results of mechanical testing.

2. INTRODUCTION

In 1988/89, ARC completed a project on improving the fire retardancy of OSB. On completion of this project, representatives from ARC, Forintek, industry and C-A FRDA held a meeting at the ARC in Edmonton on March 28, 1989. As a result of that meeting, the continuation of the project was agreed to.

At the March 28th meeting the attendees agreed to a work plan. This plan included the manufacture of 5 groups of panels on the ARC 4' x 8' press and subsequent testing for mechanical properties and fire retardancy.

This is a report summarizing the work completed in this project.

3. METHODS AND MATERIALS

3.1 Panel Manufacture

Five groups of panels were made according to the experimental design shown in Table 1. These groups were labelled "A" to "E". The general specification for all panels is shown in Table 2.

Table 1. Experimental design.

Group Label	Type
"A"	control
"B"	fines on surface, sanded both sides
"C"	0.5% DRICON in face layers
"D"	1.0% DRICON in face layers
"E"	sanded one side

Table 2. General specifications for all panels.

Face:	
furnish	- commercial aspen strands, approximately 6% MC, -3/16" fines screened out
resin	- 2.5 % powdered phenol formaldehyde
wax	-1.0% slack wax
Core:	
furnish	- commercial aspen strands, approximately 5% MC, -1/8" fines screened out
resin	- 2.5% powdered phenol formaldehyde
wax	-1.0% slack wax
Mat Construction:	
face/core ratio*	- 64/36
orientation	- machine direction face and cross direction core
mat dimensions	- 1470 mm x 2730 mm
Panel Characteristics:	
target density	- 640 kg/m^3 (40 lb/ft^3)
target thickness*	- 11.1 mm (0.437 in)
trimmed dimension	- 1220 mm x 2440 mm

* Note: Target thickness for the sanded groups (Groups "B" and "E") refers to the final thickness after sanding. Also the face to core ratio refers to the ratio after sanding and includes fines on the face of Group "B".

Following is the production specification for these panels.

3.1.1 Group "A", Control

Commercial aspen strands were obtained from an OSB mill. Both "face" and "core" strands were obtained. The "face" strands had approximately 6% moisture content and were screened to remove -3/16" fines. The "core" strands were approximately 5% moisture content and were screened to remove -1/8" fines. Both groups of strands were waferized on CAE disc waferizers, set to produce 0.64 mm (0.025 in) thick by 75 mm (3 in) strands. The lab analysis of "core" strands is given in Appendix A and of "face" strands in Appendix B.

Slack wax and powdered phenol formaldehyde resin were added to the strands in a 1220 mm deep by 2440 mm diameter drum blender. The wax was added at a 1.0% level and the resin at 2.5%.

The resinated strands were formed on the 4' x 8' forming line. "Face" strands were aligned in the machine direction and the"core" strands in the cross direction as for typical OSB construction. The "face" to "core" weight ratio of the mat was 64/36.

The mats were pressed using 3500 kPa (500 psi) closing pressure on the mat. On average the closing time to final 11.1 mm thickness was approximately 75 seconds. The panels were pressed for a total of 250 seconds including the closing time and a 20 second degas time. Steam temperature to the platen was maintained at 220°C (428°F), which gave a mat surface to platen temperature of 205°C (400°F) maximum.

3.1.2 Group "B"

Group "B" panels with fines on the surface were made similar to the Group "A" control panels except for the following differences:

i. Fines were added to both the bottom and top faces at the mat. The fines were obtained from a commercial mill and screened in the lab to remove + 3/16" oversize and - 14 mesh screen undersize. 5.0% powdered phenol formaldehyde and 1.0% slack wax were added to the fines.

ii. the weight ratio of the mat was:

- 38% "face" strands
- 36% "core" strands
- 26% fines

iii. The pressing time was increased to 290 seconds and the target thickness at pressing was increased to 13.1 mm.

iv. The panels were sanded (80 grid) on both sides to remove 1.0 mm on each side to give a final thickness of 11.1 mm.

3.1.3 Group "C"

Group "C" panels were made similar to the Group "A" control panels except that 0.5% DRICON was added to the "face" strands. The "face" strands were first sprayed with water to increase their moisture content to 40%. A 20% DRICON solution was then sprayed onto the strands at 0.5% solids weight to oven dry

strand weight. The strands were then air dried back down to approximately 5% moisture content.

The process was identical to the Group "A" control panels after the DRICON had been added and the moisture content was brought down to 5%.

3.1.4 Group "D"

Group "D" panels were made exactly the same as Group "C" panels except that 1.0% DRICON was added to the "face" strands rather than 0.5% as for Group "C".

3.1.5 Group "E"

Group "E" panels were made similar to the Group "A" panels, except that more "face" strands were added to the top face of the mat, which was then sanded off. The panels pressed to 12.1 mm thickness to take into account the extra strands in the top face layer. Only the top face was sanded (80 grid) to remove 1.0 mm and give a final thickness of 11.1 mm.

3.2 Panel Testing

3.2.1 Mechanical Properties

Three panels from each group were tested in accordance with CAN3-0437.1-M85 for the following properties:

i. Modulus of Elasticity
ii. Modulus of Rupture
iii. Internal Bond
iv. Bond Durability - MOR after 2 hour boil
v. Thickness Swell - 24 hour soak
vi. Linear Expansion - oven dry to saturated

3.2.2 Flame Spread

Flame spread tests were conducted on two panels each from groups "A" and "E" and on three panels each from groups "B", "C" and "D". The tests were done by Warnock Hersey Professional Services Ltd., Fire Laboratories Division, in accordance with CAN4 S102-M88, "Standard Method of Test for the Surface Burning Characteristics of Building Materials and Assemblies".

The samples for flame spread testing were conditioned to equilibrium at 50 ± 5% relative humidity and 23 ± 3°C temperature.

The reason for the unequal amount of samples among groups was that initially two flame spread tests were conducted for each group. Once the results

were evaluated, a third sample was only tested if the difference between the two initial samples was greater than '10' FSC.

5. RESULTS AND DISCUSSION

The mechanical properties of the panels is summarized in Table 3.

All properties are similar and meet CAN3-0437.0-M85 requirements for 0-2 OSB, except for group "C" and "D" on thickness swell.

The flame spread tests are shown in Table 4. The control group (Group "A") was worst and Group "E" which was sanded on one side was best. However, all flame spread classifications were very high and significantly higher than similar panels tried in the previous year.

Table 3. Summary of mechanical properties.

Test	Units	Dir'n	CAN3-0437 0-2 Req.	A	B	C	D	E
Modulus of Rupture	MPa MPa	Para Perp	29.0 12.4	33.7 16.7	31.8 17.8	31.2 19.0	30.9 18.7	36.4 18.8
Modulus of Elasticity	MPa MPa	Para Perp	5500 1500	6500 2100	5200 2700	5700 2700	6200 2300	6800 2100
Internal Bond	MPa	N/A	0.345	0.646	0.557	0.549	0.605	0.556
Bond durability - MOR after 2 h boil	MPa MPa	Para Perp	14.5 6.2	19.6 10.4	17.5 10.6	18.1 11.8	16.9 10.5	18.8 10.6
Thickness Swell -24 h soak - 12.7 mm or thinner	%	N/A	25	25	23	30	31	23
Linear expansion - oven dry to saturated	%	Para Perp	0.40 0.40	0.21 0.35	0.25 0.31	0.22 0.31	0.25 0.33	0.21 0.35

Table 4. Summary of flame spread results.

Group	Trial No.	Flame Spread Classification	Smoke Developed	Fuel Contributed
"A"	9	214	235	143
	11	215	309	134
	Avg	215	270	140
"B"	1	206	293	125
	3	191	324	133
	7	178	306	133
	Avg	190	310	130
"C"	5	178	288	124
	10	215	227	132
	13	199	206	132
	Avg	195	240	130
"D"	6	178	246	127
	8	233	232	120
	12	187	243	130
	Avg	200	240	125
"E"	2	174	203	144
	4	184	290	119
	Avg	180	245	130

6. CONCLUSIONS

From the results of this project it can be concluded that:

1. Panels with DRICON added had more thickness swelling from the other groups tried.

2. All other mechanical properties, other than thickness swell, were similar for all groups tried.

3. Panels with the sanded surface had the best flame spread classification.

4. The flame spread classification for all panel groups tried was extremely and abnormally high.

7. RECOMMENDATIONS

It is recommended that another meeting be set up between industry and government to decided in which direction to go from here.

8. REFERENCES

1. Canadian Standards Association, CAN4-S102-M88, Standard Test Method for Surface Burning Characteristics of Building Materials, Toronto, Ontario, 1988.

2. Canadian Standards Association, CAN3-0437.0-M, Waferboard and Strandboard, Toronto, Ontario, 1985.

3. Canadian Standards Association, CAN3-0437.1-M, Test Methods for Waferboard and Strandboard, Toronto, Ontario, 1985.

4. Alberta Research Council, FPLE 121, Chemical Treatment of Waferboard/OSB for Fire Retardancy, Edmonton, Alberta, 1989.

Appendix A

Analysis of Core Strands Used for
1220 mm x 2440 mm OSB in
Fire Retardancy Project

Table A-1

Client: ARC
Project Number: 40606000
Date Tested: December 21, 1989

Furnish Type: Core (11/29/89)

Ref. ID: PLGD - 15

Moisture Content: 4.4%

FURNISH BULK DENSITY

Sample	Net Weight (g)	Oven Dry Weight (g)	Forming Area (m^2)	Total Volume (m^3)	Oven Dry Bulk Dens. (kg/m^3)
1	1782	1707	0.0706	0.02	85.34
2	1760	1686	0.0706	0.02	84.29
3	1764	1690	0.0706	0.02	84.48
				Average	84.71

FURNISH SIEVE FRACTIONS (WILLIAMS CLASSIFIER)

Test Number		Tray Sizes: +1 1/8"	+7/8"	+5/8"	+3/8"	+3/16"	-3/16"	Total Weight (g)
1	Weight (g)	487.6	278.5	199.9	562.0	246.9	86.6	1861.5
	% Fraction	26.2%	15.0%	10.7%	30.2%	13.3%	4.7%	
2	Weight (g)	523.4	298.1	211.9	565.0	215.2	85.2	1898.8
	% Fraction	27.6%	15.7%	11.2%	29.8%	11.3%	4.5%	
3	Weight (g)	429.5	272.7	204.0	520.3	194.8	87.2	1708.5
	% Fraction	25.1%	16.0%	11.9%	30.5%	11.4%	5.1%	
Average	Weight (g)	480.2	283.1	205.3	549.1	219.0	86.3	1822.9
	% Fraction	26.3%	15.5%	11.3%	30.1%	12.0%	4.7%	

ALBERTA RESEARCH COUNCIL
Research & Development Laboratory

Table A-2

TABLE ID: PLGS - 27
FLAKE GEOMETRY ANALYSIS SUMMARY
ALBERTA RESEARCH COUNCIL FOREST PRODUCTS PROGRAM
PANEL DEVELOPMENT LABORATORY

Project: Fire Retardancy
Proj. No.: 40606000
Comments: 12.2% fines removed (<3/8")

Date: December 21, 1989
Material: Aspen Core (12/29/89)

Data File: plgs15

Disk ID: PLGD - 15

No. of Samples: 100

	Thickness (mm)	Length (mm)	Width (mm)	Aspect Ratio	Slenderness Ratio
Mean	0.60	55.2	11.3	8.53	107.0
Std. Deviation	0.27	20.0	7.9	7.56	59.4
95 % C.I. +/-	0.05	3.9	1.6	1.48	11.6
Upper Limit	0.65	59.1	12.9	10.01	118.6
Lower limit	0.55	51.3	9.8	7.05	95.3
Low	0.18	16.9	1.7	1.05	16.6
Median	0.57	51.1	9.6	5.58	91.2
High	1.84	85.9	40.1	37.76	316.2

Flake Geometry Frequency Distribution

	Thickness		Length		Width	
Class Interval:	0.10 mm		10.0 mm		3.0 mm	
	Class (mm)	Relative Freq.	Class (mm)	Relative Freq.	Class (mm)	Relative Freq.
<=	0.05	0.00	<= 5.0	0.00	<= 1.5	0.00
	0.10	0.00	10.0	0.00	3.0	0.26
	0.20	0.03	20.0	0.03	6.0	0.17
	0.30	0.13	30.0	0.16	9.0	0.10
	0.40	0.13	40.0	0.20	12.0	0.08
	0.50	0.16	50.0	0.16	15.0	0.11
	0.60	0.22	60.0	0.09	18.0	0.13
	0.70	0.08	70.0	0.05	21.0	0.08
	0.80	0.07	80.0	0.30	24.0	0.03
	0.90	0.09	90.0	0.01	27.0	0.01
	1.00	0.05	100.0	0.00	30.0	0.00
	1.10	0.01	110.0	0.00	33.0	0.02
	1.20	0.01	120.0	0.00	36.0	0.00
	1.30	0.00	130.0	0.00	39.0	0.01
>	1.35	0.02	> 135.0	0.00	> 40.5	0.00
Total:		1.00		1.00		1.00

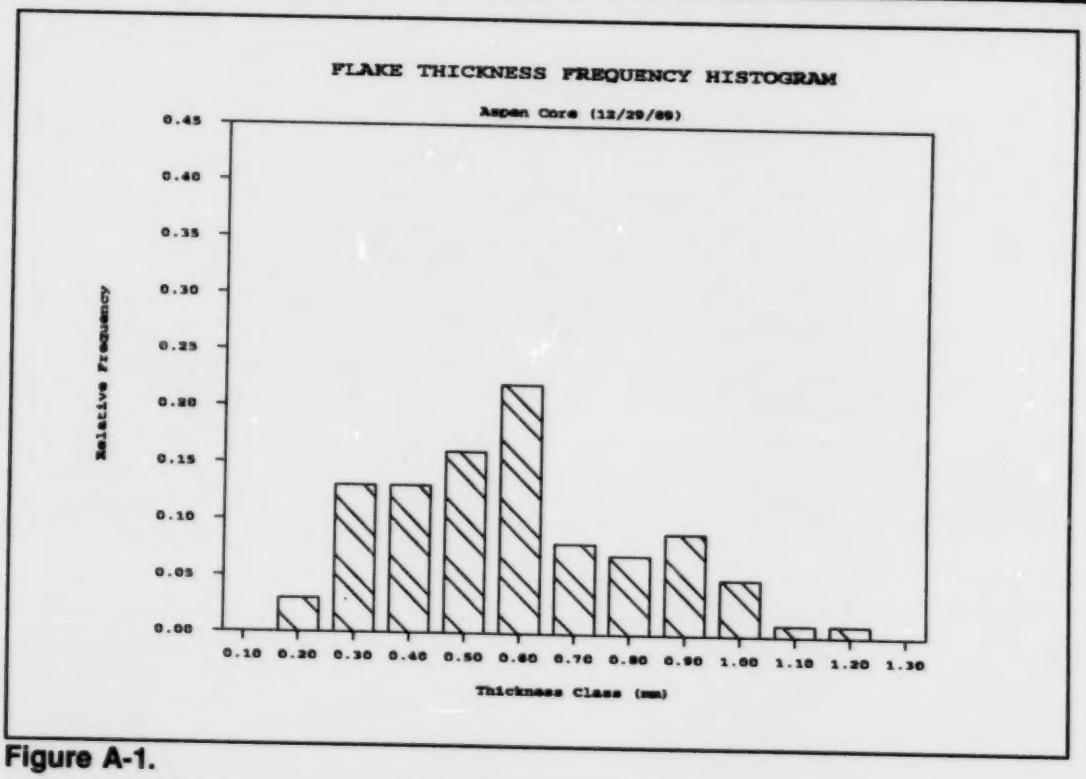

Figure A-1.

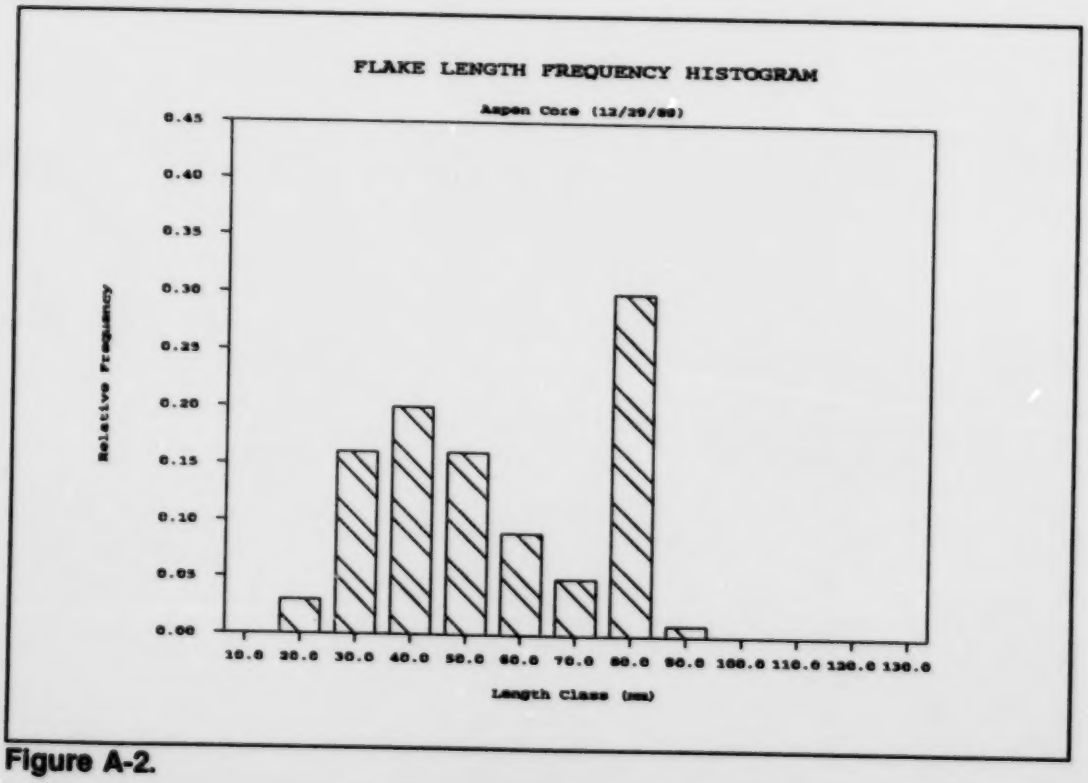

Figure A-2.

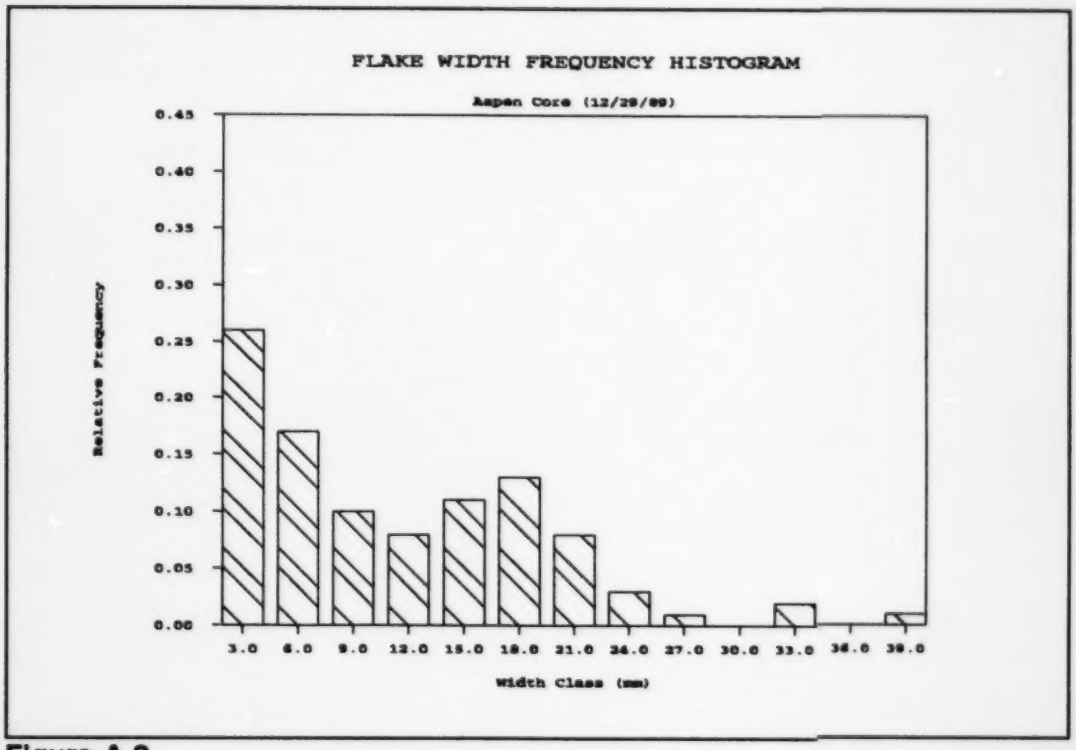
FLAKE WIDTH FREQUENCY HISTOGRAM
Aspen Core (12/29/89)
Relative Frequency
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
3.0
6.0
9.0
12.0
15.0
18.0
21.0
24.0
27.0
30.0
33.0
36.0
39.0
Width Class (mm)

Figure A-3.

Appendix B

Analysis of Face Strands Used
for 1220 mm x 2440 mm OSB in
Fire Retardancy Project

Table B-1

Client: ARC
Project Number: 40606000
Date Tested: January 4, 1989

Furnish Type: Face (12/19/89)
File Reference: PLGD - 20

Moisture Content: 5.2%

FURNISH BULK DENSITY

Sample	Net Weight (g)	Oven Dry Weight (g)	Forming Area (m^2)	Total Volume (m^3)	Oven Dry Bulk Dens. (kg/m^3)
1	1471	1398	0.0706	0.02	69.91
2	1558	1481	0.0706	0.02	74.05
3	1608	1529	0.0706	0.02	76.43
				Average	73.46

FURNISH SIEVE FRACTIONS (WILLIAMS CLASSIFIER)

Test Number		Tray Sizes: +1 1/8"	+7/8"	+5/8"	+3/8"	+3/16"	-3/16"	Total Weight (g)
1	Weight (g)	500.6	208.9	157.2	403.4	141.3	40.1	1451.5
	% Fraction	34.5%	14.4%	10.8%	27.8%	9.7%	2.8%	
2	Weight (g)	572.1	208.4	183.5	442.5	152.4	60.8	1619.7
	% Fraction	35.3%	12.9%	11.3%	27.3%	9.4%	3.8%	
3	Weight (g)	726.3	195.4	184.4	415.1	151.3	67.2	1739.7
	% Fraction	41.7%	11.2%	10.6%	23.9%	8.7%	3.9%	
Average	Weight (g)	599.7	204.2	175.0	420.3	148.3	56.0	1603.6
	% Fraction	37.2%	12.8%	10.9%	26.3%	9.3%	3.5%	

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Table B-2

TABLE ID: PLGS - 20
FLAKE GEOMETRY ANALYSIS SUMMARY
ALBERTA RESEARCH COUNCIL FOREST PRODUCTS PROGRAM
PANEL DEVELOPMENT LABORATORY

Project: Fire Retardancy
Proj. No.: 40606000
Comments: 11.0% fines removed (<3/8")

Date: January 8, 1990
Material: Aspen Face (12/19/89)

Data File: plgs20

Disk ID: PLGD - 20

No. of Samples: 100

	Thickness (mm)	Length (mm)	Width (mm)	Aspect Ratio	Slenderness Ratio
Mean	0.64	55.5	10.1	8.33	95.2
Std. Deviation	0.26	21.1	8.2	5.66	41.3
95 % C.I. +/-	0.05	4.1	1.6	1.11	8.1
Upper Limit	0.69	59.7	11.7	9.44	103.3
Lower limit	0.59	51.4	8.5	7.23	87.1
Low	0.17	18.5	1.6	1.00	25.9
Median	0.59	53.4	7.7	6.95	92.6
High	1.96	89.5	40.9	30.12	190.0

Flake Geometry Frequency Distribution

	Thickness		Length		Width	
Class Interval:	0.10 mm		10.0 mm		3.0 mm	
	Class (mm)	Relative Freq.	Class (mm)	Relative Freq.	Class (mm)	Relative Freq.
	<= 0.05	0.00	<= 5.0	0.00	<= 1.5	0.00
	0.10	0.00	10.0	0.00	3.0	0.27
	0.20	0.02	20.0	0.07	6.0	0.22
	0.30	0.02	30.0	0.17	9.0	0.16
	0.40	0.11	40.0	0.17	12.0	0.15
	0.50	0.26	50.0	0.11	15.0	0.02
	0.60	0.22	60.0	0.07	18.0	0.07
	0.70	0.16	70.0	0.05	21.0	0.04
	0.80	0.10	80.0	0.34	24.0	0.01
	0.90	0.06	90.0	0.02	27.0	0.00
	1.00	0.01	100.0	0.00	30.0	0.01
	1.10	0.00	110.0	0.00	33.0	0.02
	1.20	0.01	120.0	0.00	36.0	0.02
	1.30	0.00	130.0	0.00	39.0	0.00
	> 1.35	0.03	> 135.0	0.00	> 40.5	0.01
Total:		1.00		1.00		1.00

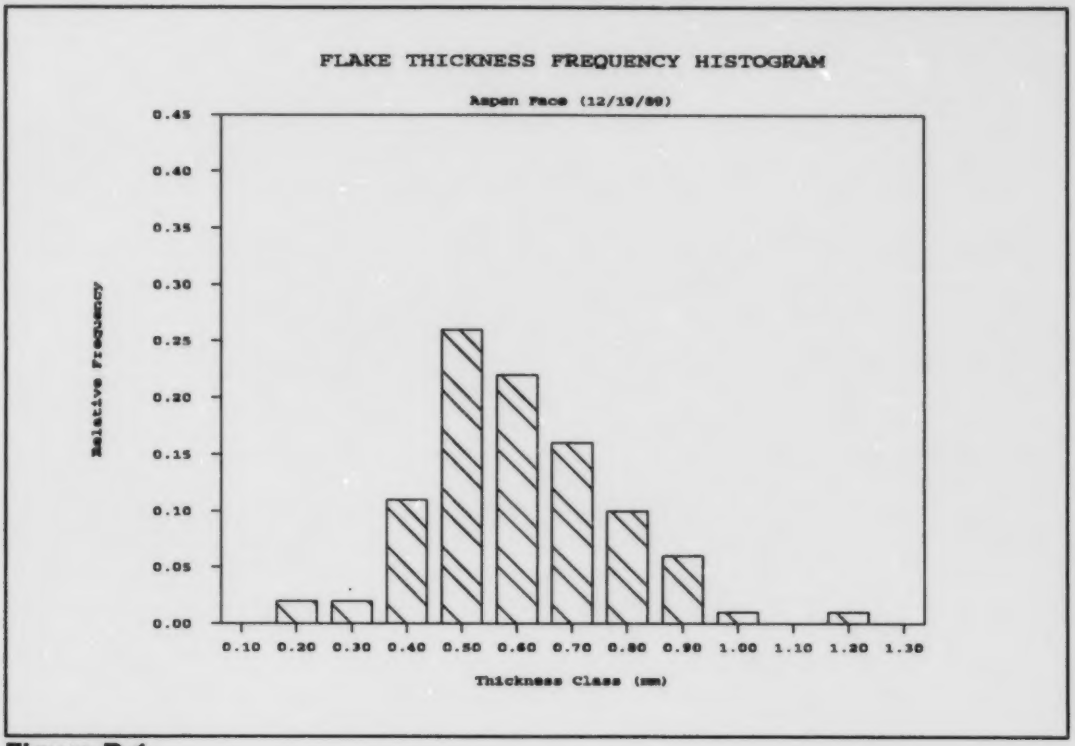

Figure B-1.

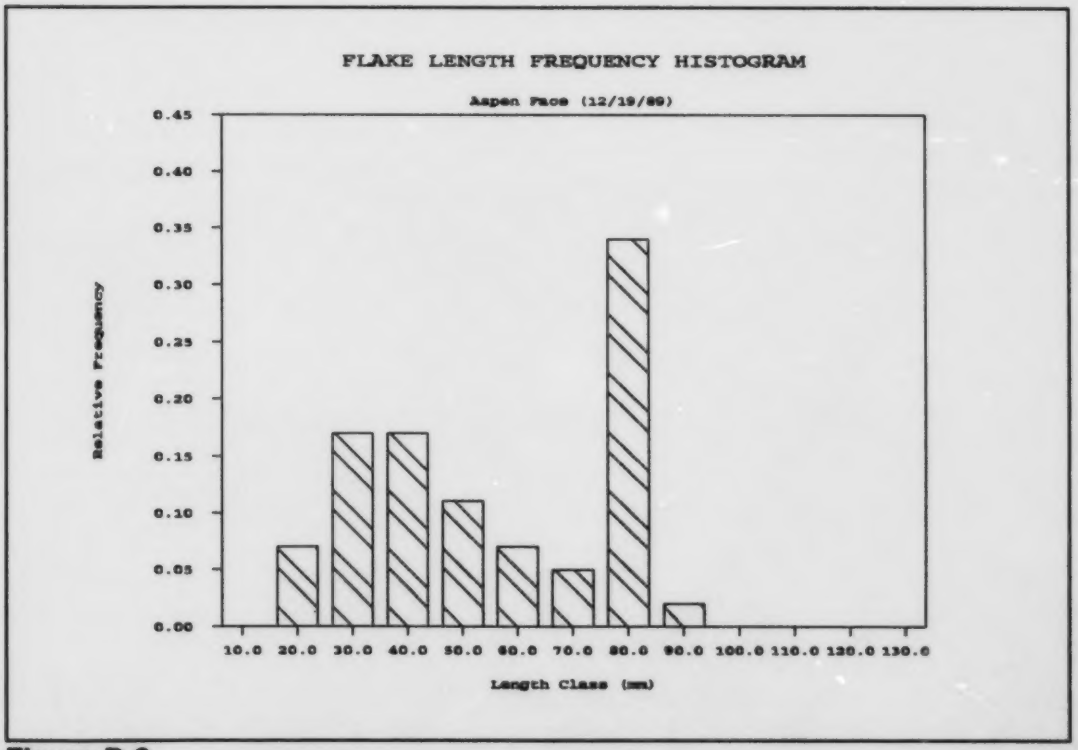

Figure B-2.

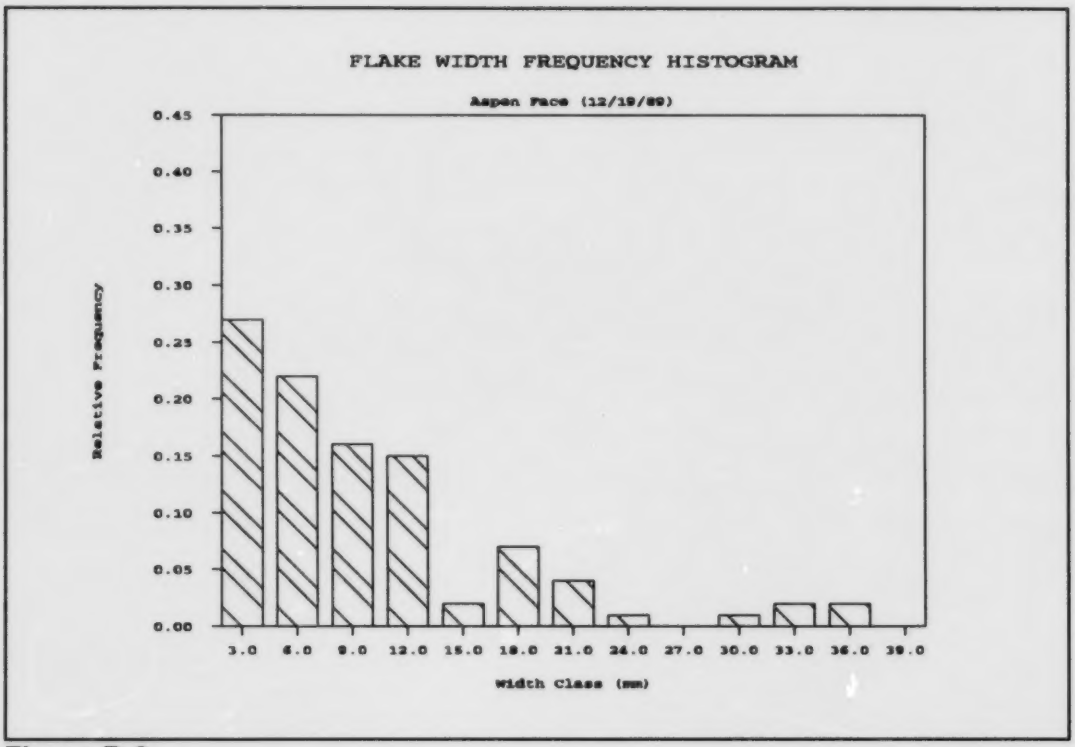
FLAKE WIDTH FREQUENCY HISTOGRAM
Aspen Face (12/19/89)
Relative Frequency
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
3.0
6.0
9.0
12.0
15.0
18.0
21.0
24.0
27.0
30.0
33.0
36.0
39.0
Width Class (mm)

Figure B-3.

Appendix C

Individual Test Results
for Group "A" (control) OSB

Table C-1

SUMMARY TABLE
GRADE PROPERTIES
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 9, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (UNSANDED)
Nom. Thickness: 11.0 mm
Conditioning: As per Test Requirement

	Units	CAN3-0437 O-2 Req.	Dir'n	A-4	A-9	A-10	3 Panel Average
Modulus of rupture	MPa	29.0	Para	39.1	32.3	29.8	33.7
	MPa	12.4	Perp	14.9	15.6	19.6	16.7
Modulus of elasticity	MPa	5500	Para	6800	6500	6100	6500
	MPa	1500	Perp	1900	2300	2100	2100
Internal bond	MPa	0.345	N/A	0.626	0.673	0.640	0.646
Bond durability -	MPa	14.5	Para	22.2	17.9	18.6	19.6
MOR after 2 h boil	MPa	6.2	Perp	9.1	10.7	11.3	10.4
Thickness swell - 24 h soak - 12.7 mm. or thinner	%	25	N/A	24	26	26	25
Linear expansion -	%	0.40	Para	0.22	0.20	0.20	0.21
oven dry to saturated		0.40	Perp	0.37	0.34	0.33	0.35

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table C-2

SUMMARY OF TESTING - MSR

Client:	A.R.C.	Test Material:	O.S.B. (UNSANDED)
Test Date:	February 2, 1990	Test Direction:	Parallel
Project Ref.:	40605000	Conditioning:	As Received
Nom. Thickness:	11.0 mm	MSR Stroke/Prestress:	12.80 mm /1.207 MPa

Sample Number	Thick-ness	MSR(1220X2440mm) MOE	MSR(1220X2440mm) EI	Density at Test (4' x 8')	Remark
	mm	GPa	N-sq.mm /Lin.mm x1000000	kg/cu.m.	
A-4	10.87	8.91	0.954	638	0437
A-5	10.86	8.39	0.896	634	FIRE
A-7	10.63	8.13	0.814	657	FIRE
A-8	10.67	8.20	0.830	634	FIRE
A-9	10.70	8.33	0.850	642	0437
A-10	10.72	8.81	0.904	635	0437
A-11	10.71	8.23	0.843	641	FIRE
A-12	10.64	8.05	0.808	637	FIRE
N	8	8	8	8	
Avg.	10.73	8.38	0.862	640	
St.Dev.	0.092	0.315	0.051	7.59	
C.V. %	0.86%	3.76%	5.90%	1.19%	

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ALBERTA RESEARCH COUNCIL

Table C-3

MOR & MOE DRY-Parallel
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 5, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (UNSANDED)
Nom. Thickness: 11.0 mm
Conditioning: As Received
Span: 264.0 mm

Panel No.	Sample No.	Thick-ness	Width	Max. Load	MOE	Avg. MOE	MOR	Avg. MOR
		mm	mm	N	MPa	MPa	MPa	MPa
	1	10.80	76.0	952	7400		42.5	
A-4	2	11.30	76.0	889	6400	6800	36.3	39.1
	3	11.00	75.4	884	6700		38.4	
	1	10.68	76.0	715	6700		32.7	
A-9	2	11.60	75.8	850	5800	6500	33.0	32.3
	3	10.96	76.0	717	7000		31.1	
	1	10.76	76.2	634	6300		28.5	
A-10	2	10.76	75.6	671	6600	6100	30.4	29.8
	3	10.78	76.0	681	5500		30.5	
No.		9	9	9	9	3	9	3
Avg.		10.96	75.9	777	6500	6500	33.7	33.7
S.D.		0.305	0.247	116	580	351	4.52	4.80
C.V.		2.78%	0.33%	14.97%	8.92%	5.40%	13.41%	14.25%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table C-4

MOR & MOE DRY-Perpendicular
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 5, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (UNSANDED)
Nom. Thickness: 11.0 mm
Conditioning: As Received
Span: 264.0 mm

Panel No.	Sample No.	Thick-ness	Width	Max. Load	MOE	Avg. MOE	MOR	Avg. MOR
		mm	mm	N	MPa	MPa	MPa	MPa
	4	10.94	75.8	316	1900		13.8	
A-4	5	10.98	76.0	379	1800	1900	16.4	14.9
	6	11.16	76.0	344	2000		14.4	
	4	10.62	75.6	389	2600		18.1	
A-9	5	10.88	75.6	305	1900	2300	13.5	15.6
	6	11.16	76.0	366	2400		15.3	
	4	10.78	76.2	436	2100		19.5	
A-10	5	10.96	75.6	464	2200	2100	20.2	19.6
	6	11.02	76.2	445	2100		19.0	
No.		9	9	9	9	3	9	3
Avg.		10.94	75.9	383	2100	2100	16.7	16.7
S.D.		0.172	0.247	56.6	257	200	2.59	2.54
C.V.		1.57%	0.33%	14.80%	12.24%	9.52%	15.53%	15.23%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table C-5

Internal Bond
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 6, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (UNSANDED)
Nom. Thickness: 11.0 mm
Conditioning: As Received

Panel No.	Sample Number	Sample Length	Sample Width	Maximum Load	Internal Bond Strength	Average For Panel
		mm	mm	N	MPa	MPa
A-4	1	50.6	50.6	1803	0.704	
	2	50.8	50.6	1844	0.717	
	3	51.4	50.6	1364	0.524	0.626
	4	50.4	50.0	1641	0.651	
	5	50.4	50.0	1619	0.642	
	6	50.4	50.0	1305	0.518	
A-9	1	50.8	50.4	1730	0.676	
	2	50.8	50.4	1899	0.742	
	3	50.8	50.4	1864	0.728	0.673
	4	50.8	50.2	1546	0.606	
	5	50.8	50.2	1702	0.667	
	6	50.8	50.2	1578	0.619	
A-10	1	50.8	50.6	1594	0.620	
	2	50.8	50.6	1711	0.666	
	3	51.2	50.6	1699	0.656	0.640
	4	51.4	50.6	1613	0.620	
	5	51.0	50.6	1511	0.586	
	6	51.2	50.4	1783	0.691	
No.		18	18	18	18	3
Avg.		50.8	50.4	1656	0.646	0.646
S.D.		0.303	0.232	161	0.063	0.024
C.V.		0.60%	0.46%	9.75%	9.70%	3.72%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table C-6

Bond Durability-MOR after 2 Hour Boil-Parallel
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 8, 1990
Proj.Ref.: 40605000
Span: 264.0 mm

Test Material: O.S.B. (UNSANDED)
Nom. Thickness: 11.0 mm
Conditioning: 2 Hour Boil

Panel No.	Sample No.	Sample Thickness	Sample Width	Maximum Load	MOR	Average MOR for Panel
		mm	mm	N	MPa	MPa
	1	10.78	75.8	562	25.3	
A-4	2	11.36	75.8	428	17.3	22.2
	3	10.74	75.4	529	24.1	
	1	10.76	76.2	434	19.5	
A-9	2	11.44	76.0	434	17.3	17.9
	3	10.74	75.8	375	17.0	
	1	10.68	76.2	496	22.6	
A-10	2	10.66	75.8	384	17.7	18.6
	3	10.70	76.2	344	15.6	
No.		9	9	9	9	3
Avg.		10.87	75.9	443	19.6	19.6
S.D.		0.302	0.27	73.0	3.51	2.31
C.V.		2.77%	0.35%	16.49%	17.90%	11.80%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table C-7

Bond Durability-MOR after 2 Hour Boil-Perpendicular
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 8, 1990
Proj.Ref.: 40605000
Span: 264.0 mm

Test Material: O.S.B. (UNSANDED)
Nom. Thickness: 11.0 mm
Conditioning: 2 Hour Boil

Panel No.	Sample No.	Sample Thickness	Sample Width	Maximum Load	MOR	Average MOR for Panel
		mm	mm	N	MPa	MPa
	4	10.92	75.8	265	11.6	
A-4	5	10.98	76.2	174	7.5	9.1
	6	11.28	75.8	202	8.3	
	4	10.96	75.6	255	11.1	
A-9	5	11.06	75.6	293	12.5	10.7
	6	11.26	76.0	203	8.3	
	4	10.72	76.2	257	11.6	
A-10	5	11.06	75.8	288	12.3	11.3
	6	11.10	76.0	238	10.1	
No.		9	9	9	9	3
Avg.		11.04	75.9	242	10.4	10.4
S.D.		0.172	0.23	40.9	1.90	1.13
C.V.		1.56%	0.30%	16.94%	18.31%	10.85%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table C-8

Thickness Swell
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 6, 1990
Proj. Ref.: 40605000

Test Material: O.S.B. (UNSANDED)
Nom. Thickness: 11.0 mm
Conditioning: 24 hr. Soak

Panel No.	Sample No.	Dry Thickness Position 1	Dry Thickness Position 2	Dry Thickness Position 3	Dry Thickness Position 4	Wet Thickness Position 1	Wet Thickness Position 2	Wet Thickness Position 3	Wet Thickness Position 4	Sample Thick. Swell	Panel Thick. Swell
		mm	mm	mm	mm	mm	mm	mm	mm	%	%
A-4	1	10.95	10.90	11.05	11.00	13.45	14.25	13.50	12.90	23	24
	2	11.05	11.10	11.05	11.20	14.50	13.35	13.85	14.00	25	
A-9	1	10.70	10.80	10.75	10.75	13.55	13.20	13.05	14.20	26	26
	2	10.85	10.75	10.90	10.65	13.95	13.50	13.45	13.40	26	
A-10	1	10.90	10.80	10.90	10.75	14.05	13.20	13.85	13.50	26	26
	2	10.85	10.80	10.75	10.70	13.30	14.10	13.15	13.75	26	
No.		6	6	6	6	6	6	6	6	6	3
Avg.		10.88	10.87	10.90	10.84	13.80	13.60	13.48	13.63	25	25
St.Dev.		0.12	0.13	0.13	0.21	0.45	0.46	0.34	0.46	1.11	0.91
C.V.		1.07%	1.22%	1.23%	1.97%	3.26%	3.39%	2.50%	3.41%	4.38%	3.61%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table C-9

Linear Expansion-Oven Dry to Saturated
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 7, 1990
Proj. Ref.: 40605000

Test Material: O.S.B. (UNSANDED)
Nom. Thickness: 11.0 mm
Conditioning: OD to Saturated

Panel No.	Sample No.		Oven Dry Gauge Length		Vac.-Pressure Gauge Length		Linear Expansion		Avg. Linear Expansion	
	Par.	Perp.	Par.	Perp.	Par.	Perp.	Par.	Perp.	Par.	Perp.
			mm	mm	mm	mm	%	%	%	%
A-4	1	3	234.15	231.95	234.65	232.80	0.21	0.37	0.22	0.37
	2	4	233.60	231.60	234.15	232.45	0.24	0.37		
A-9	1	3	229.30	233.20	229.75	233.95	0.20	0.32	0.20	0.34
	2	4	230.50	233.50	230.95	234.35	0.20	0.36		
A-10	1	3	233.00	231.30	233.45	232.00	0.19	0.30	0.20	0.33
	2	4	232.40	231.60	232.90	232.45	0.22	0.37		
No.			6	6	6	6	6	6	3	3
Avg.			232.16	232.19	232.64	233.00	0.21	0.35	0.21	0.35
S.D.			1.88	0.93	1.91	0.93	0.02	0.03	0.01	0.02
C.V.			0.81%	0.40%	0.82%	0.40%	7.92%	8.20%	7.10%	4.77%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Appendix D

Individual Test Results
for Group"B" (fines on surface,
sanded both sides) OSB

Table D-1

SUMMARY TABLE
GRADE PROPERTIES
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 26, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (Sanded both sides)
Nom. Thickness: 11.0 mm
Conditioning: As per Test Requirement

	Units	CAN3-0437 O-2 Req.	Dir'n	B-1	B-4	B-6	3 Panel Average
Modulus of rupture	MPa	29.0	Para	29.3	32.9	33.3	31.8
	MPa	12.4	Perp	17.6	18.0	17.8	17.8
Modulus of elasticity	MPa	5500	Para	5200	5300	5300	5200
	MPa	1500	Perp	2800	2800	2600	2700
Internal bond	MPa	0.345	N/A	0.427	0.650	0.595	0.557
Bond durability -	MPa	14.5	Para	17.7	17.0	17.8	17.5
MOR after 2 h boil	MPa	6.2	Perp	10.1	11.0	10.6	10.6
Thickness swell - 24 h soak - 12.7 mm. or thinner	%	25	N/A	28	22	18	23
Linear expansion -	%	0.40	Para	0.26	0.26	0.24	0.25
oven dry to saturated		0.40	Perp	0.35	0.31	0.27	0.31

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table D-2

SUMMARY OF TESTING - MSR

Client: A.R.C.
Test Date: February 16, 1990
Project Ref.: 40605000
Nom. Thickness: 11.0 mm

Test Material: O.S.B. (Sanded both sides)
Test Direction: Parallel
Conditioning: As Received
MSR Stroke/Prestress: 12.80 mm / 1.379 MPa

Sample Number	Thickness	MSR(1220X2440mm) MOE	MSR(1220X2440mm) EI	Density at Test (4' x 8')	Remark
	mm	GPa	N-sq.mm /Lin.mm x1000000	kg/cu.m.	
B-1	11.08	6.10	0.691	652	0437
B-2	11.07	6.33	0.716	654	FIRE
B-3	11.09	6.39	0.726	642	FIRE
B-4	11.07	5.97	0.675	644	0437
B-5	11.11	6.32	0.722	648	FIRE
B-6	11.10	5.91	0.674	639	0437
B-7	11.06	6.24	0.704	649	FIRE
B-8	11.11	6.31	0.721	648	FIRE
N	8	8	8	8	
Avg.	11.09	6.20	0.704	647	
St.Dev.	0.019	0.180	0.021	5.04	
C.V. %	0.17%	2.91%	3.01%	0.78%	

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ALBERTA RESEARCH COUNCIL

Table D-3

MOR & MOE DRY-Parallel
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 26, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (Sanded both sides)
Nom. Thickness: 11.0 mm
Conditioning: As Received
Span: 264.0 mm

Panel No.	Sample No.	Thick-ness	Width	Max. Load	MOE	Avg. MOE	MOR	Avg. MOR
		mm	mm	N	MPa	MPa	MPa	MPa
	1	11.20	75.2	757	5200		31.8	
B-1	2	11.10	75.2	750	4800	5200	32.1	29.3
	3	11.12	75.2	562	5500		23.9	
	1	11.22	75.2	783	5400		32.8	
B-4	2	11.26	75.0	628	4400	5300	26.2	32.9
	3	11.18	75.2	946	6000		39.9	
	1	11.22	75.0	843	5400		35.4	
B-6	2	11.18	75.2	830	5400	5300	35.0	33.3
	3	11.12	75.0	691	5000		29.5	
No.		9	9	9	9	3	9	3
Avg.		11.18	75.1	754	5200	5200	31.8	31.8
S.D.		0.054	0.100	116	458	57.7	4.84	2.23
C.V.		0.49%	0.13%	15.41%	8.81%	1.11%	15.22%	7.00%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table D-4

MOR & MOE DRY-Perpendicular
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 26, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (Sanded both sides)
Nom. Thickness: 11.0 mm
Conditioning: As Received
Span: 264.0 mm

Panel No.	Sample No.	Thick-ness	Width	Max. Load	MOE	Avg. MOE	MOR	Avg. MOR
		mm	mm	N	MPa	MPa	MPa	MPa
	4	11.24	75.2	389	2500		16.2	
B-1	5	11.26	75.0	454	3000	2800	18.9	17.6
	6	11.24	75.4	425	2800		17.7	
	4	11.24	75.2	375	2500		15.6	
B-4	5	11.22	75.4	397	2800	2800	16.6	18.0
	6	11.24	75.4	526	3100		21.9	
	4	11.20	75.4	450	2600		18.8	
B-6	5	11.22	75.0	383	2700	2600	16.1	17.8
	6	11.16	75.2	440	2500		18.6	
No.		9	9	9	9	3	9	3
Avg.		11.22	75.2	427	2700	2700	17.8	17.8
S.D.		0.030	0.167	47.7	222	115	1.98	0.212
C.V.		0.26%	0.22%	11.19%	8.24%	4.28%	11.10%	1.19%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table D-5

Internal Bond
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 21, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (Sanded both sides)
Nom. Thickness: 11.0 mm
Conditioning: As Received

Panel No.	Sample Number	Sample Length	Sample Width	Maximum Load	Internal Bond Strength	Average For Panel
		mm	mm	N	MPa	MPa
B-1	1	50.0	50.4	1019	0.404	0.427
	2	49.8	50.0	964	0.387	
	3	50.0	50.2	1107	0.441	
	4	49.8	50.0	862	0.346	
	5	49.8	50.2	1167	0.467	
	6	49.6	50.2	1287	0.517	
B-4	1	49.8	50.6	1705	0.677	0.650
	2	49.8	50.6	1450	0.575	
	3	49.6	50.6	1636	0.652	
	4	49.8	50.4	1638	0.653	
	5	50.0	50.6	1634	0.646	
	6	50.0	50.6	1760	0.696	
B-6	1	50.0	50.4	1402	0.556	0.595
	2	49.6	50.4	1445	0.578	
	3	50.2	50.4	1570	0.621	
	4	50.0	50.4	1687	0.669	
	5	50.0	50.2	1524	0.607	
	6	50.0	50.4	1359	0.539	
No.		18	18	18	18	3
Avg.		49.9	50.4	1401	0.557	0.557
S.D.		0.170	0.197	277	0.108	0.116
C.V.		0.34%	0.39%	19.74%	19.45%	20.82%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table D-6

Bond Durability-MOR after 2 Hour Boil-Parallel
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 22, 1990
Proj.Ref.: 40605000
Span: 264.0 mm

Test Material: O.S.B. (Sanded both sides)
Nom. Thickness: 11.0 mm
Conditioning: 2 Hour Boil

Panel No.	Sample No.	Sample Thickness	Sample Width	Maximum Load	MOR	Average MOR for Panel
		mm	mm	N	MPa	MPa
	1	11.22	75.4	534	22.3	
B-1	2	11.20	75.4	426	17.8	17.7
	3	11.22	75.4	311	13.0	
	1	11.24	75.4	375	15.6	
B-4	2	11.24	75.2	403	16.8	17.0
	3	11.22	75.2	443	18.5	
	1	11.24	75.0	471	19.7	
B-6	2	11.24	75.4	432	18.0	17.8
	3	11.20	75.0	371	15.6	
No.		9	9	9	9	3
Avg.		11.22	75.3	418	17.5	17.5
S.D.		0.017	0.173	64.1	2.67	0.435
C.V.		0.15%	0.23%	15.32%	15.30%	2.49%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table D-7

Bond Durability-MOR after 2 Hour Boil-Perpendicular
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 22, 1990
Proj.Ref.: 40605000
Span: 264.0 mm

Test Material: O.S.B. (Sanded both sides)
Nom. Thickness: 11.0 mm
Conditioning: 2 Hour Boil

Panel No.	Sample No.	Sample Thickness	Sample Width	Maximum Load	MOR	Average MOR for Panel
		mm	mm	N	MPa	MPa
	4	11.20	75.2	191	8.0	
B-1	5	11.24	75.0	236	9.9	10.1
	6	11.22	75.2	295	12.3	
	4	11.22	75.2	275	11.5	
B-4	5	11.22	75.4	207	8.6	11.0
	6	11.24	75.2	309	12.9	
	4	11.20	75.4	269	11.3	
B-6	5	11.18	75.2	258	10.9	10.6
	6	11.18	75.2	232	9.8	
No.		9	9	9	9	3
Avg.		11.21	75.2	252	10.6	10.6
S.D.		0.023	0.120	39.3	1.63	0.470
C.V.		0.20%	0.16%	15.57%	15.43%	4.44%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table D-8

Thickness Swell
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 21, 1990
Proj. Ref.: 40605000

Test Material: O.S.B. (Sanded both sides)
Nom. Thickness: 11.0 mm
Conditioning: 24 hr. Soak

Panel No.	Sample No.	Dry Thickness Position 1	2	3	4	Wet Thickness Position 1	2	3	4	Sample Thick. Swell	Panel Thick. Swell
		mm	mm	mm	mm	mm	mm	mm	mm	%	%
B-1	1	11.25	11.20	11.25	11.20	13.85	13.90	13.95	14.10	24	28
	2	11.25	11.20	11.25	11.20	15.50	14.20	15.05	14.70	32	
B-4	1	11.25	11.25	11.25	11.20	14.40	13.45	12.80	13.55	21	22
	2	11.25	11.20	11.25	11.15	13.75	14.20	13.55	13.90	24	
B-6	1	11.25	11.20	11.25	11.20	12.85	12.75	13.25	13.30	16	18
	2	11.15	11.20	11.15	11.20	13.00	13.65	13.60	13.05	19	
No.		6	6	6	6	6	6	6	6	6	3
Avg.		11.23	11.21	11.23	11.19	13.89	13.69	13.70	13.77	23	23
St.Dev.		0.041	0.020	0.041	0.020	0.974	0.549	0.766	0.596	5.60	5.35
C.V.		0.36%	0.18%	0.36%	0.18%	7.01%	4.01%	5.59%	4.33%	24.67%	23.59%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table D-9

Linear Expansion-Oven Dry to Saturated
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 23, 1990
Proj. Ref.: 40605000

Test Material: O.S.B. (Sanded both sides)
Nom. Thickness: 11.0 mm
Conditioning: OD to Saturated

Panel No.	Sample No.		Oven Dry Gauge Length		Vac.-Pressure Gauge Length		Linear Expansion		Avg. Linear Expansion	
	Par.	Perp.	Par.	Perp.	Par.	Perp.	Par.	Perp.	Par.	Perp.
			mm	mm	mm	mm	%	%	%	%
B-1	1	3	231.10	231.55	231.75	232.40	0.28	0.37	0.26	0.35
	2	4	230.95	231.50	231.50	232.25	0.24	0.32		
B-4	1	3	232.75	231.10	233.30	231.85	0.24	0.32	0.26	0.31
	2	4	231.45	231.05	232.10	231.75	0.28	0.30		
B-6	1	3	231.40	232.75	231.95	233.40	0.24	0.28	0.24	0.27
	2	4	232.15	231.85	232.70	232.45	0.24	0.26		
No.			6	6	6	6	6	6	3	3
Avg.			231.63	231.63	232.22	232.35	0.25	0.31	0.25	0.31
S.D.			0.69	0.62	0.67	0.59	0.02	0.04	0.01	0.04
C.V.			0.30%	0.27%	0.29%	0.25%	8.98%	12.33%	5.01%	12.42%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Appendix E

Individual Test Results for Group "C"
(0.5% DRICON in face layers) OSB

Table E-1

SUMMARY TABLE
GRADE PROPERTIES
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 9, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (DRICON 0.5%)
Nom. Thickness: 11.0 mm
Conditioning: As per Test Requirement

	Units	CAN3-0437 O-2 Req.	Dir'n	C-2	C-4	C-6	3 Panel Average
Modulus of rupture	MPa	29.0	Para	33.1	33.6	26.9	31.2
	MPa	12.4	Perp	17.8	19.0	20.3	19.0
Modulus of elasticity	MPa	5500	Para	6200	5800	5100	5700
	MPa	1500	Perp	2200	3000	2900	2700
Internal bond	MPa	0.345	N/A	0.628	0.513	0.506	0.549
Bond durability -	MPa	14.5	Para	19.4	18.0	17.0	18.1
MOR after 2 h boil	MPa	6.2	Perp	10.5	12.0	12.8	11.8
Thickness swell - 24 h soak - 12.7 mm. or thinner	%	25	N/A	30	30	30	30
Linear expansion -	%	0.40	Para	0.21	0.21	0.25	0.22
oven dry to saturated		0.40	Perp	0.36	0.31	0.27	0.31

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table E-2

SUMMARY OF TESTING - MSR

Client: A.R.C.
Test Date: February 1, 1990
Project Ref.: 40605000
Nom. Thickness: 11.0 mm

Test Material: O.S.B. (DRICON 0.5%)
Test Direction: Parallel
Conditioning: As Received
MSR Stroke/Prestress: 12.80 mm /1.379 MPa

Sample Number	Thick-ness	MSR(1220X2440mm) MOE	MSR(1220X2440mm) EI	Density at Test (4' x 8')	Remark
	mm	GPa	N-sq.mm /Lin.mm x1000000	kg/cu.m.	
C-1	10.55	7.99	0.782	644	FIRE
C-2	10.80	7.80	0.819	650	0437
C-3	10.85	8.63	0.919	646	FIRE
C-4	10.79	6.95	0.728	647	0437
C-5	10.67	6.71	0.679	649	FIRE
C-6	10.87	6.64	0.711	634	0437
C-7	10.96	6.66	0.731	641	NO TEST
C-8	10.87	6.31	0.675	632	FIRE
C-9	10.94	6.05	0.660	637	FIRE
N	9	9	9	9	
Avg.	10.81	7.08	0.745	642	
St.Dev.	0.130	0.861	0.083	6.59	
C.V. %	1.21%	12.15%	11.16%	1.03%	

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ALBERTA RESEARCH COUNCIL

Table E-3

MOR & MOE DRY-Parallel
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 5, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (DRICON 0.5%)
Nom. Thickness: 11.0 mm
Conditioning: As Received
Span: 264.0 mm

Panel No.	Sample No.	Thick-ness	Width	Max. Load	MOE	Avg. MOE	MOR	Avg. MOR
		mm	mm	N	MPa	MPa	MPa	MPa
	1	11.00	76.2	778	6300		33.4	
C-2	2	11.36	75.6	800	5900	6200	32.5	33.1
	3	11.12	76.2	797	6500		33.5	
	1	11.20	75.8	794	5800		33.1	
C-4	2	10.84	76.4	707	5600	5800	31.2	33.6
	3	11.38	76.0	907	6000		36.5	
	1	11.08	75.8	597	5200		25.4	
C-6	2	10.94	76.0	610	4700	5100	26.6	26.9
	3	11.02	75.8	669	5400		28.8	
No.		9	9	9	9	3	9	3
Avg.		11.10	76.0	740	5700	5700	31.2	31.2
S.D.		0.182	0.254	102	558	557	3.61	3.73
C.V.		1.64%	0.33%	13.73%	9.79%	9.77%	11.57%	11.94%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table E-4

MOR & MOE DRY-Perpendicular
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 5, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (DRICON 0.5%)
Nom. Thickness: 11.0 mm
Conditioning: As Received
Span: 264.0 mm

Panel No.	Sample No.	Thick-ness	Width	Max. Load	MOE	Avg. MOE	MOR	Avg. MOR
		mm	mm	N	MPa	MPa	MPa	MPa
	4	11.32	76.0	403	2100		16.4	
C-2	5	11.50	75.8	505	2300	2200	19.9	17.8
	6	11.08	75.4	397	2100		17.0	
	4	10.90	75.8	463	2800		20.4	
C-4	5	11.66	76.4	438	3000	3000	16.7	19.0
	6	11.10	76.0	473	3100		20.0	
	4	11.16	75.6	422	2800		17.7	
C-6	5	11.48	76.0	503	2800	2900	19.9	20.3
	6	11.06	76.0	547	3200		23.3	
No.		9	9	9	9	3	9	3
Avg.		11.25	75.9	461	2700	2700	19.0	19.0
S.D.		0.252	0.285	50.9	420	436	2.26	1.27
C.V.		2.24%	0.38%	11.04%	15.54%	16.14%	11.86%	6.67%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table E-5

Internal Bond
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 6, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (DRICON 0.5%)
Nom. Thickness: 11.0 mm
Conditioning: As Received

Panel No.	Sample Number	Sample Length	Sample Width	Maximum Load	Internal Bond Strength	Average For Panel
		mm	mm	N	MPa	MPa
C-2	1	50.8	50.4	1704	0.666	0.628
	2	50.8	50.4	1719	0.671	
	3	50.8	50.4	1856	0.725	
	4	50.8	50.4	1528	0.597	
	5	50.8	50.4	1693	0.661	
	6	50.8	50.4	1150	0.449	
C-4	1	50.8	50.4	1340	0.523	0.513
	2	50.8	50.2	917	0.360	
	3	50.8	50.4	1258	0.491	
	4	50.8	50.2	1394	0.547	
	5	50.8	50.2	1485	0.582	
	6	50.8	50.2	1466	0.575	
C-6	1	50.8	50.2	1346	0.528	0.506
	2	50.8	50.2	1551	0.608	
	3	50.8	50.4	1097	0.428	
	4	50.8	50.4	1246	0.487	
	5	50.8	50.2	1243	0.487	
	6	50.8	50.2	1262	0.495	
No.		18	18	18	18	3
Avg.		50.8	50.3	1403	0.549	0.549
S.D.		0.000	0.102	245	0.096	0.069
C.V.		0.00%	0.20%	17.46%	17.40%	12.52%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table E-6

Bond Durability-MOR after 2 Hour Boil-Parallel
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 8, 1990
Proj.Ref.: 40605000
Span: 264.0 mm

Test Material: O.S.B. (DRICON 0.5%)
Nom. Thickness: 11.0 mm
Conditioning: 2 Hour Boil

Panel No.	Sample No.	Sample Thickness	Sample Width	Maximum Load	MOR	Average MOR for Panel
		mm	mm	N	MPa	MPa
	1	10.84	76.4	473	20.9	
C-2	2	11.30	75.8	472	19.3	19.4
	3	11.30	76.4	441	17.9	
	1	11.22	76.0	449	18.6	
C-4	2	10.80	76.4	472	21.0	18.0
	3	11.14	75.8	341	14.4	
	1	10.94	75.8	376	16.4	
C-6	2	11.04	75.8	475	20.4	17.0
	3	11.06	76.0	334	14.2	
No.		9	9	9	9	3
Avg.		11.07	76.0	426	18.1	18.1
S.D.		0.186	0.28	58.9	2.61	1.19
C.V.		1.68%	0.37%	13.84%	14.43%	6.55%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table E-7

Bond Durability-MOR after 2 Hour Boil-Perpendicular
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 8, 1990
Proj.Ref.: 40605000
Span: 264.0 mm

Test Material: O.S.B. (DRICON 0.5%)
Nom. Thickness: 11.0 mm
Conditioning: 2 Hour Boil

Panel No.	Sample No.	Sample Thickness	Sample Width	Maximum Load	MOR	Average MOR for Panel
		mm	mm	N	MPa	MPa
	4	10.96	76.2	254	11.0	
C-2	5	11.40	76.0	218	8.7	10.5
	6	10.82	75.8	262	11.7	
	4	11.00	76.0	291	12.5	
C-4	5	11.48	76.4	300	11.8	12.0
	6	11.00	75.8	269	11.6	
	4	11.12	76.0	332	14.0	
C-6	5	11.34	76.4	283	11.4	12.8
	6	11.04	76.0	304	13.0	
No.		9	9	9	9	3
Avg.		11.13	76.1	279	11.8	11.8
S.D.		0.225	0.22	33.1	1.46	1.18
C.V.		2.03%	0.29%	11.86%	12.39%	10.03%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table E-8

Thickness Swell
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 6, 1990
Proj. Ref.: 40605000

Test Material: O.S.B. (DRICON 0.5%)
Nom. Thickness: 11.0 mm
Conditioning: 24 hr. Soak

Panel No.	Sample No.	Dry Thickness Position 1	Dry Thickness Position 2	Dry Thickness Position 3	Dry Thickness Position 4	Wet Thickness Position 1	Wet Thickness Position 2	Wet Thickness Position 3	Wet Thickness Position 4	Sample Thick. Swell	Panel Thick. Swell
		mm	mm	mm	mm	mm	mm	mm	mm	%	%
C-2	1	11.30	11.15	11.15	11.05	14.95	14.65	13.85	13.75	28	30
	2	11.20	11.20	11.25	11.20	14.70	14.50	15.75	14.20	32	
C-4	1	11.45	11.50	11.60	11.55	15.35	15.35	14.70	14.75	30	30
	2	11.40	11.25	11.15	11.20	14.85	14.30	14.05	15.25	30	
C-6	1	11.20	11.20	11.20	10.95	13.90	14.90	14.75	13.65	28	30
	2	11.10	11.15	11.05	11.20	15.15	15.05	13.95	14.15	31	
No.		6	6	6	6	6	6	6	6	6	3
Avg.		11.28	11.24	11.23	11.19	14.82	14.79	14.51	14.29	30	30
St.Dev.		0.13	0.13	0.19	0.20	0.50	0.38	0.72	0.61	1.48	0.24
C.V.		1.18%	1.17%	1.70%	1.82%	3.40%	2.60%	4.96%	4.27%	4.94%	0.81%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table E-9

Linear Expansion-Oven Dry to Saturated
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 7, 1990
Proj. Ref.: 40605000

Test Material: O.S.B. (DRICON 0.5%)
Nom. Thickness: 11.0 mm
Conditioning: OD to Saturated

Panel No.	Sample No.		Oven Dry Gauge Length		Vac.-Pressure Gauge Length		Linear Expansion		Avg. Linear Expansion	
	Par.	Perp.	Par.	Perp.	Par.	Perp.	Par.	Perp.	Par.	Perp.
			mm	mm	mm	mm	%	%	%	%
C-2	1	3	233.70	232.50	234.30	233.40	0.26	0.39	0.21	0.36
	2	4	233.40	233.95	233.80	234.75	0.17	0.34		
C-4	1	3	230.85	232.65	231.35	233.30	0.22	0.28	0.21	0.31
	2	4	232.00	232.80	232.45	233.60	0.19	0.34		
C-6	1	3	231.10	233.50	231.70	234.15	0.26	0.28	0.25	0.27
	2	4	231.75	231.45	232.30	232.05	0.24	0.26		
No.			6	6	6	6	6	6	3	3
Avg.			232.13	232.81	232.65	233.54	0.22	0.31	0.22	0.31
S.D.			1.18	0.87	1.17	0.91	0.04	0.05	0.02	0.05
C.V.			0.51%	0.37%	0.50%	0.39%	15.86%	15.85%	10.26%	15.23%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Appendix F

Individual Test Results for Group "D"
(1.0% DRICON in face layers) OSB

Table F-1

SUMMARY TABLE
GRADE PROPERTIES
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 9, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (DRICON 1.0%)
Nom. Thickness: 11.0 mm
Conditioning: As per Test Requirement

	Units	CAN3-0437 O-2 Req.	Dir'n	D-1	D-2	D-3	3 Panel Average
Modulus of rupture	MPa	29.0	Para	26.1	35.5	31.2	30.9
	MPa	12.4	Perp	14.7	20.9	20.6	18.7
Modulus of elasticity	MPa	5500	Para	5900	6200	6400	6200
	MPa	1500	Perp	1900	2600	2500	2300
Internal bond	MPa	0.345	N/A	0.595	0.607	0.614	0.605
Bond durability -	MPa	14.5	Para	16.6	18.5	15.6	16.9
MOR after 2 h boil	MPa	6.2	Perp	9.8	10.6	11.1	10.5
Thickness swell - 24 h soak - 12.7 mm. or thinner	%	25	N/A	32	30	32	31
Linear expansion -	%	0.40	Para	0.26	0.24	0.26	0.25
oven dry to saturated		0.40	Perp	0.33	0.32	0.32	0.33

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table F-2

SUMMARY OF TESTING - MSR

Client:	A.R.C.	Test Material:	O.S.B. (DRICON 1.0%)
Test Date:	February 1, 1990	Test Direction:	Parallel
Project Ref.:	40605000	Conditioning:	As Received
Nom. Thickness:	11.0 mm	MSR Stroke/Prestress:	12.80 mm /1.207 MPa

Sample Number	Thick-ness	MSR(1220X2440mm) MOE	MSR(1220X2440mm) EI	Density at Test (4' x 8')	Remark
	mm	GPa	N-sq.mm /Lin.mm x1000000	kg/cu.m.	
D-1	10.62	8.23	0.821	649	0437
D-2	10.54	7.34	0.716	639	0437
D-3	10.67	7.74	0.784	638	0437
D-4	10.58	7.97	0.787	652	FIRE
D-5	10.71	7.86	0.805	640	FIRE
D-6	10.82	7.61	0.803	636	FIRE
D-7	10.77	8.06	0.839	646	FIRE
D-8	10.84	7.50	0.796	641	FIRE
N	8	8	8	8	
Avg.	10.69	7.79	0.794	643	
St.Dev.	0.111	0.299	0.036	5.71	
C.V. %	1.04%	3.84%	4.56%	0.89%	

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ALBERTA RESEARCH COUNCIL

Table F-3

MOR & MOE DRY-Parallel
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 5, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (DRICON 1.0%)
Nom. Thickness: 11.0 mm
Conditioning: As Received
Span: 264.0 mm

Panel No.	Sample No.	Thick-ness	Width	Max. Load	MOE	Avg. MOE	MOR	Avg. MOR
		mm	mm	N	MPa	MPa	MPa	MPa
	1	10.96	76.2	613	6200		26.5	
D-1	2	11.26	76.0	545	4800	5900	22.4	26.1
	3	11.60	75.8	756	6700		29.4	
	1	10.46	75.6	862	7000		41.3	
D-2	2	11.10	75.8	603	5300	6200	25.6	35.5
	3	10.50	76.4	843	6200		39.6	
	1	10.80	76.0	628	5900		28.1	
D-3	2	10.90	76.0	842	7600	6400	36.9	31.2
	3	10.86	76.0	648	5800		28.6	
No.		9	9	9	9	3	9	3
Avg.		10.94	76.0	704	6200	6200	30.9	30.9
S.D.		0.356	0.233	122	856	252	6.67	4.71
C.V.		3.26%	0.31%	17.29%	13.80%	4.06%	21.56%	15.22%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table F-4

MOR & MOE DRY-Perpendicular
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 6, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (DRICON 1.0%)
Nom. Thickness: 11.0 mm
Conditioning: As Received
Span: 264.0 mm

Panel No.	Sample No.	Thick-ness	Width	Max. Load	MOE	Avg. MOE	MOR	Avg. MOR
		mm	mm	N	MPa	MPa	MPa	MPa
	4	11.20	76.0	352	2100		14.6	
D-1	5	11.26	75.8	395	1900	1900	16.3	14.7
	6	11.56	76.2	341	1600		13.3	
	4	10.60	76.0	564	2900		26.2	
D-2	5	10.60	76.0	410	2500	2600	19.0	20.9
	6	10.50	75.6	366	2300		17.4	
	4	10.74	76.0	483	2500		21.8	
D-3	5	11.10	76.0	419	2200	2500	17.7	20.6
	6	10.66	75.6	480	2800		22.1	
No.		9	9	9	9	3	9	3
Avg.		10.91	75.9	423	2300	2300	18.7	18.7
S.D.		0.374	0.203	73.1	417	379	4.06	3.46
C.V.		3.42%	0.27%	17.26%	18.12%	16.46%	21.70%	18.48%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table F-5

Internal Bond
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 6, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (DRICON 1.0%)
Nom. Thickness: 11.0 mm
Conditioning: As Received

Panel No.	Sample Number	Sample Length	Sample Width	Maximum Load	Internal Bond Strength	Average For Panel
		mm	mm	N	MPa	MPa
	1	50.8	50.6	1342	0.522	
	2	50.8	50.2	1454	0.570	
D-1	3	50.8	50.2	1629	0.639	0.595
	4	50.8	50.4	1568	0.612	
	5	50.8	50.4	1607	0.628	
	6	50.8	50.4	1528	0.597	
	1	51.2	50.4	1941	0.752	
	2	51.2	50.4	1764	0.684	
D-2	3	51.2	50.4	1295	0.502	0.607
	4	51.2	50.4	1705	0.661	
	5	51.2	50.6	1497	0.578	
	6	51.2	50.6	1202	0.464	
	1	50.4	50.2	1760	0.696	
	2	50.8	50.4	1737	0.678	
D-3	3	50.4	50.4	1490	0.587	0.614
	4	50.8	50.6	1677	0.652	
	5	50.6	50.4	1308	0.513	
	6	50.6	50.6	1426	0.557	
No.		18	18	18	18	3
Avg.		50.9	50.4	1552	0.605	0.605
S.D.		0.274	0.135	195	0.076	0.010
C.V.		0.54%	0.27%	12.57%	12.62%	1.60%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table F-6

Bond Durability-MOR after 2 Hour Boil-Parallel
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 8, 1990
Proj.Ref.: 40605000
Span: 264.0 mm

Test Material: O.S.B. (DRICON 1.0%)
Nom. Thickness: 11.0 mm
Conditioning: 2 Hour Boil

Panel No.	Sample No.	Sample Thickness	Sample Width	Maximum Load	MOR	Average MOR for Panel
		mm	mm	N	MPa	MPa
	1	10.88	76.2	383	16.8	
D-1	2	11.26	76.2	345	14.1	16.6
	3	11.56	76.0	485	18.9	
	1	10.56	76.0	411	19.2	
D-2	2	10.82	76.0	375	16.7	18.5
	3	10.56	76.2	422	19.7	
	1	10.74	76.0	346	15.6	
D-3	2	10.86	75.8	291	12.9	15.6
	3	10.70	76.0	403	18.3	
No.		9	9	9	9	3
Avg.		10.88	76.0	385	16.9	16.9
S.D.		0.329	0.13	55.3	2.36	1.47
C.V.		3.03%	0.18%	14.37%	13.93%	8.70%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table F-7

Bond Durability-MOR after 2 Hour Boil-Perpendicular
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 8, 1990
Proj.Ref.: 40605000
Span: 264.0 mm

Test Material: O.S.B. (DRICON 1.0%)
Nom. Thickness: 11.0 mm
Conditioning: 2 Hour Boil

Panel No.	Sample No.	Sample Thickness	Sample Width	Maximum Load	MOR	Average MOR for Panel
		mm	mm	N	MPa	MPa
	4	10.98	76.2	265	11.4	
D-1	5	11.26	75.8	211	8.7	9.8
	6	10.58	76.2	202	9.4	
	4	10.46	75.8	226	10.8	
D-2	5	10.68	75.8	196	9.0	10.6
	6	10.70	75.6	261	11.9	
	4	10.88	76.0	293	12.9	
D-3	5	10.94	75.8	222	9.7	11.1
	6	10.68	76.0	236	10.8	
No.		9	9	9	9	3
Avg.		10.80	75.9	235	10.5	10.5
S.D.		0.243	0.20	32.4	1.43	0.65
C.V.		2.25%	0.27%	13.79%	13.60%	6.16%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table F-8

Thickness Swell
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 6, 1990
Proj. Ref.: 40605000

Test Material: O.S.B. (DRICON 1.0%)
Nom. Thickness: 11.0 mm
Conditioning: 24 hr. Soak

Panel No.	Sample No.	Dry Thickness Position 1	2	3	4	Wet Thickness Position 1	2	3	4	Sample Thick. Swell	Panel Thick. Swell
		mm	mm	mm	mm	mm	mm	mm	mm	%	%
D-1	1	10.85	11.05	11.05	10.95	13.45	14.40	15.00	14.50	31	32
	2	11.65	11.75	11.80	11.65	14.30	16.35	15.25	16.25	33	
D-2	1	10.80	10.70	10.80	10.70	14.20	14.35	14.50	13.45	31	30
	2	10.55	10.60	10.70	10.50	13.15	14.40	14.20	12.65	28	
D-3	1	11.00	10.90	10.95	10.90	14.75	14.75	14.15	14.40	33	32
	2	11.05	11.00	10.80	11.00	14.50	14.20	14.75	14.45	32	
No.		6	6	6	6	6	6	6	6	6	3
Avg.		10.98	11.00	11.02	10.95	14.06	14.74	14.64	14.28	31	31
St.Dev.		0.37	0.41	0.40	0.39	0.62	0.81	0.44	1.21	1.60	1.25
C.V.		3.38%	3.69%	3.66%	3.56%	4.44%	5.48%	3.00%	8.47%	5.12%	4.00%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table F-9

Linear Expansion-Oven Dry to Saturated
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 7,1990
Proj. Ref.: 40605000

Test Material: O.S.B. (DRICON 1.0%)
Nom. Thickness: 11.0 mm
Conditioning: OD to Saturated

Panel No.	Sample No.		Oven Dry Gauge Length		Vac.-Pressure Gauge Length		Linear Expansion		Avg. Linear Expansion	
	Par.	Perp.	Par.	Perp.	Par.	Perp.	Par.	Perp.	Par.	Perp.
			mm	mm	mm	mm	%	%	%	%
D-1	1	3	232.50	234.20	233.10	235.00	0.26	0.34	0.26	0.33
	2	4	233.30	233.15	233.90	233.90	0.26	0.32		
D-2	1	3	235.60	231.75	236.20	232.60	0.25	0.37	0.24	0.32
	2	4	234.95	232.95	235.50	233.60	0.23	0.28		
D-3	1	3	234.00	232.20	234.60	232.95	0.26	0.32	0.26	0.32
	2	4	232.30	233.10	232.90	233.85	0.26	0.32		
No.			6	6	6	6	6	6	3	3
Avg.			233.78	232.89	234.37	233.65	0.25	0.33	0.25	0.33
S.D.			1.33	0.85	1.32	0.84	0.01	0.03	0.01	0.01
C.V.			0.57%	0.36%	0.56%	0.36%	3.72%	8.85%	2.99%	1.60%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Appendix G

Individual Test Results for Group "E"
(sanded one side) OSB

Table G-1

SUMMARY TABLE
GRADE PROPERTIES
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 26, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (Sanded)
Nom. Thickness: 11.0 mm
Conditioning: As per Test Requirement

	Units	CAN3-0437 O-2 Req.	Dir'n	E-3	E-6	E-8	3 Panel Average
Modulus of rupture	MPa	29.0	Para	33.8	39.5	35.9	36.4
	MPa	12.4	Perp	20.8	17.0	18.5	18.8
Modulus of elasticity	MPa	5500	Para	6700	7100	6600	6800
	MPa	1500	Perp	2000	2000	2200	2100
Internal bond	MPa	0.345	N/A	0.524	0.529	0.615	0.556
Bond durability - MOR after 2 h boil	MPa	14.5	Para	19.9	17.4	19.0	18.8
	MPa	6.2	Perp	11.0	9.5	11.2	10.6
Thickness swell - 24 h soak - 12.7 mm. or thinner	%	25	N/A	22	20	27	23
Linear expansion - oven dry to saturated	%	0.40	Para	0.20	0.19	0.23	0.21
		0.40	Perp	0.35	0.35	0.36	0.35

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table G-2

SUMMARY OF TESTING - MSR

Client:	A.R.C.	Test Material:	O.S.B. (SANDED)
Test Date:	February 16, 1990	Test Direction:	Parallel
Project Ref.:	40601429	Conditioning:	As Received
Nom. Thickness:	11.0 mm	MSR Stroke/Prestress:	12.80 mm / 1.379 MPa

Sample Number	Thick-ness	MSR(1220X2440mm) MOE	MSR(1220X2440mm) EI	Density at Test (4' x 8')	Remark
	mm	GPa	N-sq.mm /Lin.mm x1000000	kg/cu.m.	
E-1	10.81	8.77	0.923	647	FIRE
E-2	10.88	8.30	0.891	646	FIRE
E-3	10.86	9.38	1.001	644	0437
E-6	10.96	8.89	0.975	652	0437
E-7	10.98	8.68	0.958	645	FIRE
E-8	10.82	8.48	0.895	641	0437
E-10	10.78	8.38	0.875	652	FIRE
E-11	10.87	8.78	0.940	649	FIRE
N	8	8	8	8	
Avg.	10.87	8.71	0.932	647	
St.Dev.	0.070	0.342	0.044	3.85	
C.V. %	0.65%	3.93%	4.75%	0.60%	

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ALBERTA RESEARCH COUNCIL

Table G-3

MOR & MOE DRY-Parallel
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 26, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (Sanded)
Nom. Thickness: 11.0 mm
Conditioning: As Received
Span: 264.0 mm

Panel No.	Sample No.	Thick-ness	Width	Max. Load	MOE	Avg. MOE	MOR	Avg. MOR
		mm	mm	N	MPa	MPa	MPa	MPa
	1	11.28	75.2	886	6900		36.7	
E-3	2	11.22	75.0	680	6700	6700	28.5	33.8
	3	11.24	75.0	868	6600		36.3	
	1	11.26	74.8	1128	8300		47.1	
E-6	2	11.08	75.0	911	7100	7100	39.2	39.5
	3	11.20	75.2	766	6000		32.2	
	1	11.24	74.8	776	6700		32.5	
E-8	2	11.22	75.0	1001	7200	6600	42.0	35.9
	3	11.16	75.4	790	6000		33.3	
No.		9	9	9	9	3	9	3
Avg.		11.21	75.0	867	6800	6800	36.4	36.4
S.D.		0.060	0.194	136	693	265	5.68	2.86
C.V.		0.54%	0.26%	15.67%	10.19%	3.89%	15.60%	7.85%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table G-4

MOR & MOE DRY-Perpendicular
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 26, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (Sanded)
Nom. Thickness: 11.0 mm
Conditioning: As Received
Span: 264.0 mm

Panel No.	Sample No.	Thick-ness	Width	Max. Load	MOE	Avg. MOE	MOR	Avg. MOR
		mm	mm	N	MPa	MPa	MPa	MPa
	4	11.26	75.4	572	2100		23.7	
E-3	5	11.32	75.4	489	2000	2000	20.0	20.8
	6	11.16	75.2	442	2000		18.7	
	4	11.24	75.4	440	2000		18.3	
E-6	5	11.30	75.6	401	1900	2000	16.4	17.0
	6	11.16	75.6	389	2100		16.4	
	4	11.24	75.4	385	2200		16.0	
E-8	5	11.40	75.0	438	1900	2200	17.8	18.5
	6	11.14	75.6	512	2500		21.6	
No.		9	9	9	9	3	9	3
Avg.		11.25	75.4	452	2100	2100	18.8	18.8
S.D.		0.085	0.200	62.1	186	115	2.60	1.91
C.V.		0.76%	0.27%	13.74%	8.84%	5.50%	13.84%	10.15%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table G-5

Internal Bond
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 21, 1990
Proj.Ref.: 40605000

Test Material: O.S.B. (Sanded)
Nom. Thickness: 11.0 mm
Conditioning: As Received

Panel No.	Sample Number	Sample Length	Sample Width	Maximum Load	Internal Bond Strength	Average For Panel
		mm	mm	N	MPa	MPa
E-3	1	50.0	50.6	1269	0.502	0.524
	2	49.8	50.6	1183	0.469	
	3	49.8	50.6	1358	0.539	
	4	49.8	50.2	1400	0.560	
	5	50.0	50.2	1409	0.561	
	6	49.8	50.2	1289	0.516	
E-6	1	49.8	50.4	1047	0.417	0.529
	2	49.6	50.4	1362	0.545	
	3	49.8	50.4	1182	0.471	
	4	49.8	50.4	1368	0.545	
	5	49.6	50.0	1464	0.590	
	6	50.0	50.0	1509	0.604	
E-8	1	49.6	50.2	1883	0.756	0.615
	2	50.2	50.2	1422	0.564	
	3	49.8	50.0	1605	0.645	
	4	49.8	50.2	1855	0.742	
	5	50.2	50.6	1286	0.506	
	6	50.2	50.2	1208	0.479	
No.		18	18	18	18	3
Avg.		49.9	50.3	1394	0.556	0.556
S.D.		0.194	0.209	217	0.089	0.051
C.V.		0.39%	0.41%	15.57%	15.94%	9.23%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table G-6

Bond Durability-MOR after 2 Hour Boil-Parallel
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 22, 1990
Proj.Ref.: 40605000
Span: 264.0 mm

Test Material: O.S.B. (Sanded)
Nom. Thickness: 11.0 mm
Conditioning: 2 Hour Boil

Panel No.	Sample No.	Sample Thickness	Sample Width	Maximum Load	MOR	Average MOR for Panel
		mm	mm	N	MPa	MPa
	1	11.24	75.2	491	20.5	
E-3	2	11.32	75.0	483	19.9	19.9
	3	11.30	75.0	467	19.3	
	1	11.12	75.2	393	16.7	
E-6	2	11.20	75.2	497	20.9	17.4
	3	11.26	75.4	355	14.7	
	1	11.26	75.2	474	19.7	
E-8	2	11.32	75.0	346	14.3	19.0
	3	11.34	75.2	564	23.1	
No.		9	9	9	9	3
Avg.		11.26	75.2	452	18.8	18.8
S.D.		0.070	0.133	72.4	2.95	1.25
C.V.		0.62%	0.18%	16.00%	15.68%	6.63%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table G-7

Bond Durability-MOR after 2 Hour Boil-Perpendicular
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 22, 1990
Proj.Ref.: 40605000
Span: 264.0 mm

Test Material: O.S.B. (Sanded)
Nom. Thickness: 11.0 mm
Conditioning: 2 Hour Boil

Panel No.	Sample No.	Sample Thickness	Sample Width	Maximum Load	MOR	Average MOR for Panel
		mm	mm	N	MPa	MPa
	4	11.26	75.4	218	9.0	
E-3	5	11.34	75.6	289	11.8	11.0
	6	11.20	75.2	287	12.0	
	4	11.30	75.2	246	10.1	
E-6	5	11.28	75.6	175	7.2	9.5
	6	11.14	75.6	267	11.3	
	4	11.24	75.2	196	8.2	
E-8	5	11.32	75.0	290	11.9	11.2
	6	11.20	75.4	322	13.5	
No.		9	9	9	9	3
Avg.		11.25	75.4	254	10.6	10.6
S.D.		0.065	0.219	49.2	2.07	0.895
C.V.		0.58%	0.29%	19.34%	19.56%	8.48%

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ALBERTA RESEARCH COUNCIL

FOREST PRODUCTS LABORATORY

Table G-8

Thickness Swell
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 21, 1990
Proj. Ref.: 40605000

Test Material: O.S.B. (Sanded)
Nom. Thickness: 11.0 mm
Conditioning: 24 hr. Soak

Panel No.	Sample No.	Dry Thickness Position 1	2	3	4	Wet Thickness Position 1	2	3	4	Sample Thick. Swell	Panel Thick. Swell
		mm	mm	mm	mm	mm	mm	mm	mm	%	%
E-3	1	11.10	11.25	11.10	11.15	14.05	13.15	13.55	13.70	22	22
	2	11.30	11.30	11.25	11.25	14.10	13.90	13.45	13.30	21	
E-6	1	11.00	11.15	11.20	11.25	12.65	13.30	14.15	13.25	20	20
	2	11.30	11.25	11.30	11.30	13.05	13.85	13.55	13.50	19	
E-8	1	11.25	11.30	11.25	11.30	13.50	13.65	15.00	14.25	25	27
	2	11.30	11.30	11.30	11.35	13.85	14.90	14.20	15.20	29	
No.		6	6	6	6	6	6	6	6	6	3
Avg.		11.21	11.26	11.23	11.27	13.53	13.79	13.98	13.87	23	23
St.Dev.		0.128	0.058	0.075	0.068	0.584	0.619	0.595	0.747	3.50	3.71
C.V.		1.14%	0.52%	0.67%	0.61%	4.31%	4.49%	4.25%	5.39%	15.41%	16.33%

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Table G-9

Linear Expansion-Oven Dry to Saturated
(CAN3-0437-M85)

Client: A.R.C.
Test Date: February 23, 1990
Proj. Ref.: 40605000

Test Material: O.S.B. (Sanded)
Nom. Thickness: 11.0 mm
Conditioning: OD to Saturated

Panel No.	Sample No.		Oven Dry Gauge Length		Vac.-Pressure Gauge Length		Linear Expansion		Avg. Linear Expansion	
	Par.	Perp.	Par.	Perp.	Par.	Perp.	Par.	Perp.	Par.	Perp.
			mm	mm	mm	mm	%	%	%	%
E-3	1	3	231.70	231.50	232.20	232.40	0.22	0.39	0.20	0.35
	2	4	233.95	232.25	234.40	232.95	0.19	0.30		
E-6	1	3	228.75	230.85	229.20	231.65	0.20	0.35	0.19	0.35
	2	4	229.65	232.15	230.05	232.95	0.17	0.34		
E-8	1	3	232.15	231.35	232.70	232.20	0.24	0.37	0.23	0.36
	2	4	232.45	230.80	232.95	231.60	0.22	0.35		
No.			6	6	6	6	6	6	3	3
Avg.			231.44	231.48	231.92	232.29	0.21	0.35	0.21	0.35
S.D.			1.91	0.62	1.94	0.60	0.02	0.03	0.02	0.01
C.V.			0.83%	0.27%	0.84%	0.26%	10.71%	8.32%	9.89%	1.93%

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